

## Supplementary Materials for **Seismic potential of weak, near-surface faults revealed at plate tectonic slip rates**

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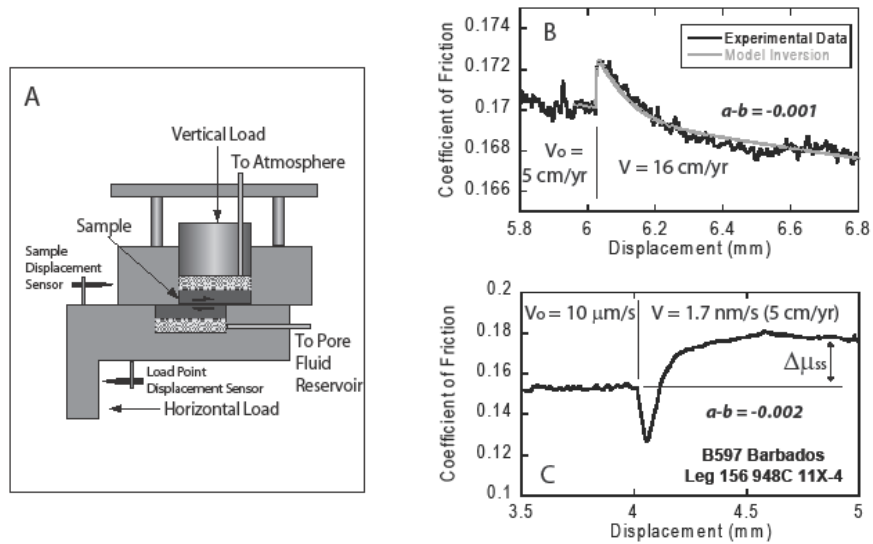
### **The PDF file includes:**

- fig. S1. Experimental apparatus and examples of experimental data.
- fig. S2. Time series of experimental friction data for a sample from the Cascadia subduction zone (experiment B565) showing details of an experimentally observed SSE.
- Legends for tables S1 to S4
- References (48–50)

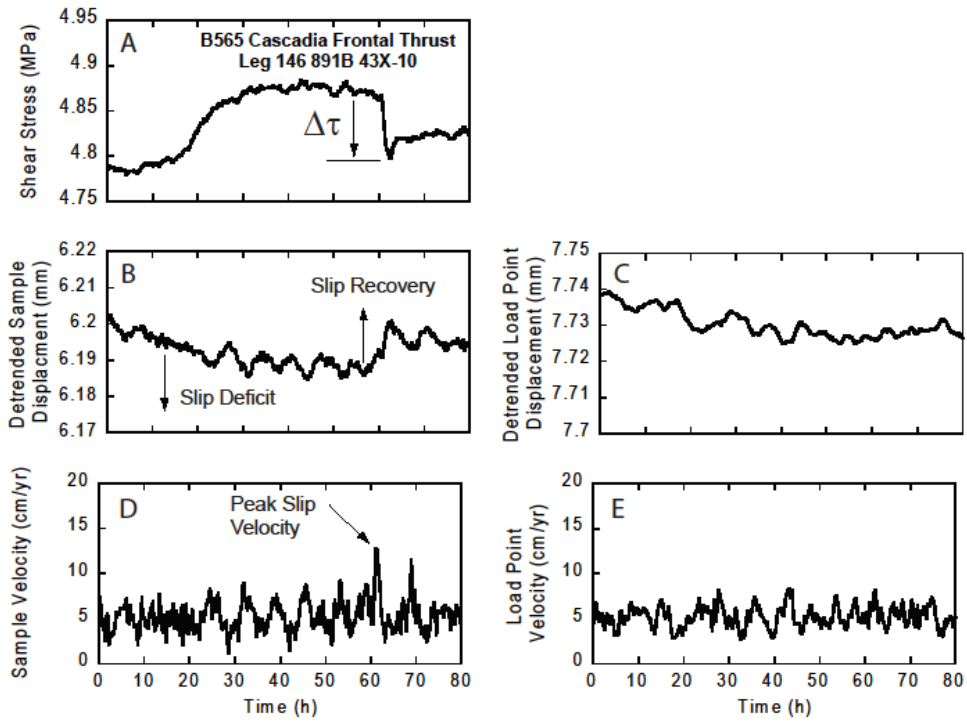
### **Other Supplementary Material for this manuscript includes the following:**

(available at [advances.sciencemag.org/cgi/content/full/3/11/e1701269/DC1](http://advances.sciencemag.org/cgi/content/full/3/11/e1701269/DC1))

- table S1 (Microsoft Excel format). Sample and sample location details.
- table S2 (Microsoft Excel format). Velocity-dependent friction parameters determined by inverse modeling.
- table S3 (Microsoft Excel format). Velocity dependence of friction determined by direct measurement.
- table S4 (Microsoft Excel format). Experimentally measured SSE parameters.



**fig. S1. Experimental apparatus and examples of experimental data.** **A.** The experimental direct-shear apparatus (modified from Ikari et al. (28, 32)). **B.** An example of experimental friction data obtained from a sample from the Barbados subduction zone (Experiment B597) showing experimental data overlain by an inverse model for a velocity step from 1.7 nm/s (5 cm/yr) to 5.1 nm/s (16 cm/yr). The  $a-b$  value obtained from the modeling procedure is -0.001. **C.** Friction data for the decrease from the initial shearing rate of 10  $\mu\text{m/s}$  down to 5 cm/yr. The  $a-b$  value obtained from direct measurement of  $\mu_o - \mu$  is -0.002.



**fig. S2. Time series of experimental friction data for a sample from the Cascadia subduction zone (experiment B565) showing details of an experimentally observed SSE. A.** Shear stress, including stress drop  $\Delta\tau$ , **B.** the sample displacement record, with the background trend from the driving rate (1.7 nm/s) removed. Decreasing values indicate slip deficit accumulation, increasing values indicate slip recovery, **C.** the load point displacement record, with the background trend from the driving rate (1.7 nm/s) removed. Note that no change in the record is observed at the time of the stress drop, **D.** The sample slip velocity, showing a clear peak coinciding with the stress drop, and **E.** The load point displacement rate, showing no velocity perturbation during the stress drop.

**table S1. Sample and sample location details.**

**table S2. Velocity-dependent friction parameters determined by inverse modeling.**

**table S3. Velocity dependence of friction determined by direct measurement.**

**table S4. Experimentally measured SSE parameters.**